

The background is a detailed technical sketch in orange lines on a dark grey background. It depicts various mechanical and electrical components, including a large circular gauge with a needle and scale, a smaller circular component with multiple ports, a coiled spring-like structure, and various electronic components like capacitors and connectors. The sketch style is intricate and technical, suggesting a focus on engineering and electronics.

Data Recording and Safety

Data Acquisition and Recording

Founded in 1887, HaslerRail has always produced speed indication and data recording systems – a fact underlined by the more than 40'000 mechanical and electronic systems in daily service all over the world today.

Since trains are more complex than ever, there is a barrage of information to gather which has either – in the case of signalling data (such as ETCS information) – to be handled instantly or has a more informative character and can be evaluated later on.

Data Recording is no longer only used for post incident/ accident data analysis; it's gone a step further and now supports safety management during daily operations as well as driver and fleet management.



Safety

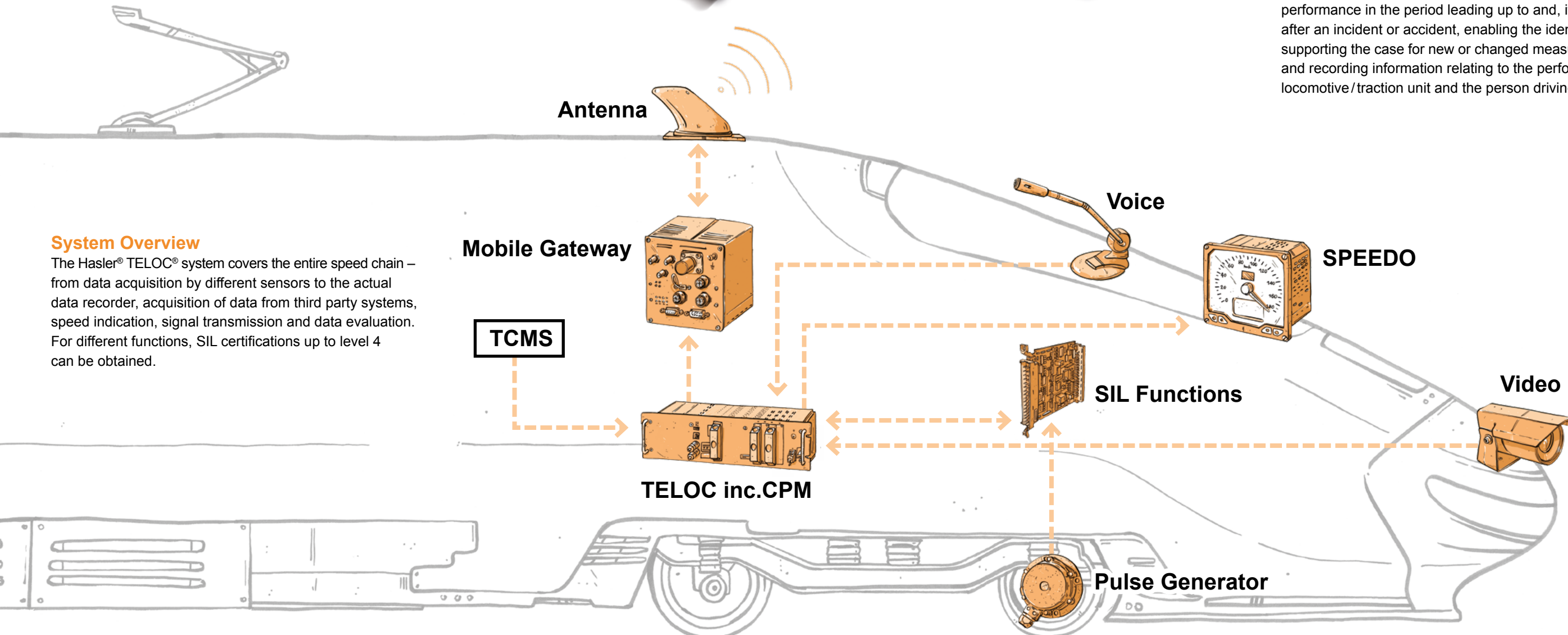
According to current EU legislation, new or modified devices with safety relevant functions have to be designed according to the EN 50126 standard in order to receive a defined Safety Integrity Level (SIL) certification. Safety-relevant information is often already available in the data recorder; therefore, it is sensible to use it to carry out safety-related functions such as roll protection, dead man function, Driver Safety Device (SIFA), speed threshold, etc. To assist our customers in the design of functions up to SIL4 level in new rolling stock or modernisation projects, HaslerRail has developed the Hasler®SABO Safety Board which also helps to simplify the certification process of an entire system.

ETCS Juridical Recording Units (JRU)

The requirements for ETCS Juridical Recording Units (JRU) are defined in TSI OPE and CCS. TSI OPE defines that data pertaining to the running of a train must be recorded and retained for the purposes of supporting systematic safety monitoring as a means of preventing incidents and accidents, identification of driver, train and infrastructure performance in the period leading up to and, if appropriate, immediately after an incident or accident, enabling the identification of causes, and supporting the case for new or changed measures to prevent recurrence and recording information relating to the performance of both the locomotive/traction unit and the person driving.

System Overview

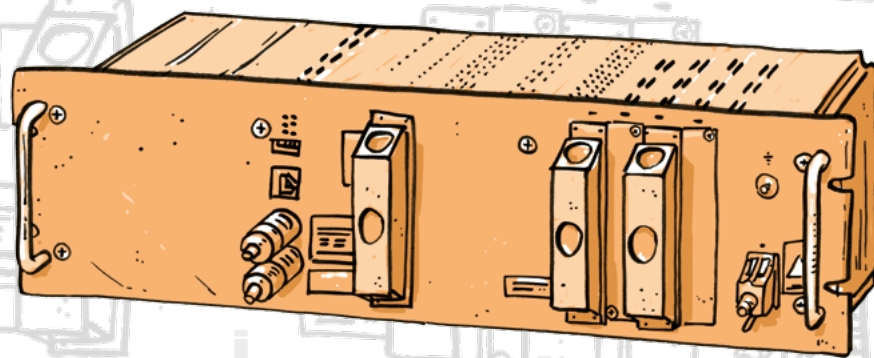
The Hasler® TELOC® system covers the entire speed chain – from data acquisition by different sensors to the actual data recorder, acquisition of data from third party systems, speed indication, signal transmission and data evaluation. For different functions, SIL certifications up to level 4 can be obtained.



TELOC® 3000

TELOC® 3000 is part of a brand new smart-tech equipment generation that satisfies the most demanding requirements. Due to the open architecture of the system, new functions can be integrated at hardware and at software level. The housing can be customised to the customer's requirements and is designed for a 19" rack. The TELOC® 3000 generation has been developed for use on all railway vehicles such as electric and diesel locomotives, high speed trains, electric and diesel multiple units and mountain railways as well as light rail vehicles, trams and metro trains.

TELOC® 3000 is certified to be used as a JRU (Juridical Recording Unit) for ETCS on-board installations in combination with national data recording. Crash protected memories are available that comply with different standards. Furthermore, it is possible to integrate safety functions up to SIL4 (EN 50126). Available functions include vigilance control, dead man function, SIFA, rollback-protection, roll-protection, speed monitoring, brake curve supervision, etc.

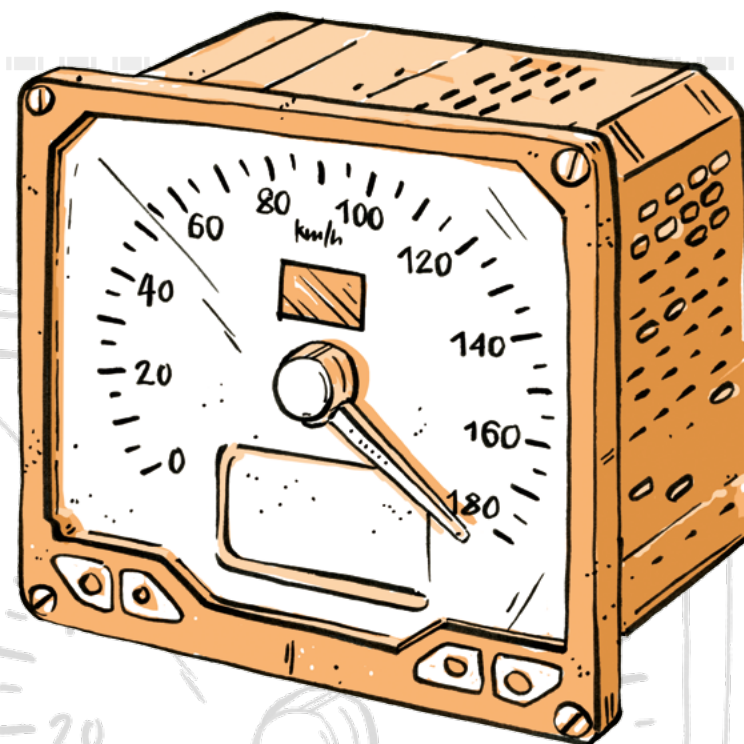


Data Transfer

TELOC® systems can be connected to mobile gateways (routers) to send data to an off-board server. This makes data accessible to different interest groups.

Data Evaluation

Data recorders have often only been used for accident/incident investigation, i.e. data is recorded and viewed on rare occasions. Therefore, the analysis software tools used were focused on data visualization. Creating information with existing accident/incident analysis software tools is a recurring and manual activity which requires training and specific domain knowledge and hence is slow and error-prone. Data analysis has to be automated in order to look at data continuously and in a uniform manner and to generate information out of recorded data. With this in mind, HaslerRail has developed its software tool Hasler®EVA+.

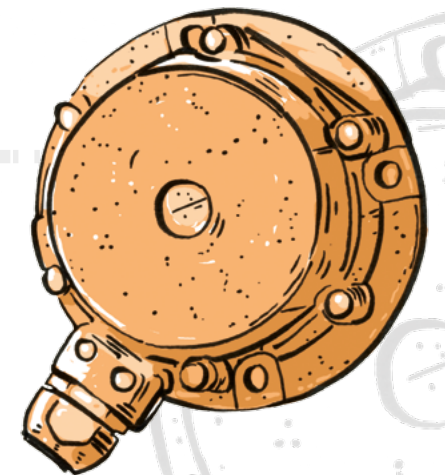


The Hasler® Pulse Generators

The design of HaslerRail's optical pulse generator, Hasler®OPG, based on an optical system that operates in the infrared range, has been designed to resist the most extreme mechanical and thermal stress.

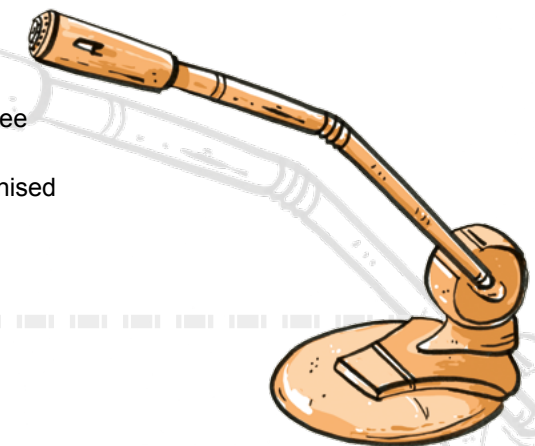
In recent years however, the increase of operational speeds and the optimization of network capacities have led to the fact that the existing standards no longer represent real-life conditions in the rail environment. Based on vibration data collected in the field, HaslerRail has designed a heavy duty pulse generator, Hasler®HDPG, around a new sensor technology in the form of a lightweight ASIC.

Pulse generators deliver signals to measure and record distance as well as speed, wheel slip and slide sensing, various control and safety functions, train safety system, etc. Due to its accuracy and reliability, Hasler®Pulse Generators are used for different signalling applications, e.g. ETCS and CBTC.



Voice and Video

HaslerRail developed a cab voice recording system for its TELOC® system a decade ago and it is in successful use on various trains. After an incident/accident it can be useful to hear and/or see what happened during the final minutes. With the new powerful TELOC® 3000 system it is also possible to record camera pictures. The camera(s) can either be installed inside the drivers' cab in order to record the driver's actions as well as his or her track view or it can be installed anywhere in the vehicle's front (e.g. in a headlight) in order to see possible events below the driver's natural line of sight. With the Hasler®EVA+ evaluation tool, it is possible to see time-synchronised pictures with other recorded data/events.



Additional Equipment

HaslerRail offers different peripheral equipment such as:

- Pressure sensors
- Different speed indicators, e.g. moving coil instruments, Hasler®SPEEDO (step motor controlled with pointer feedback), displays
- RFID card reader to record driver number, access control, etc.
- etc.

HaslerRail also offers service unit software to support the customer in commissioning and fault finding. Test equipment including bench test equipment is available on customer demand.

Plug and Play Replacement of pre-existing Data Loggers for Queensland Rail's Tilt Train

Overview

Queensland Rail's pre-existing data recorders were a part of an older generation, supplied through the train manufacturing process. With these recorders, data retrieval was a strenuous, lengthy and not always successful process. This pushed Queensland Rail to seek a cost effective means to replace the existing event recorders with a reliable and proven alternative – the Hasler® TELOC® 1500.

The Challenge

The following factors had to be considered:

- Minimal or no disruption to scheduled services: All work on the trains was to be carried out overnight and only one train was available per night
- No rewiring or reworking was permitted
- Recorder dimensions must be identical to the previous solution
- All existing event recorder functionality must be kept
- Future proofing

Implementation

Due to the short timeframe to commission the units – as access was only available during the night, it was critical to get the replacements right, as QR could not operate the trains without an event recorder.

Every challenge was overcome with in-house state of the art bench testing in HaslerRail's laboratories in Berne, Switzerland and over two nights, the Hasler® TELOC® 1500s were successfully commissioned onsite.



Siemens Sacramento S200 LRV with TELOC®3000 IEEE and FRA compliant Data Recorder



Calgary Transit unveiled the first of 63 new S200 light rail vehicles in January 2016. San Francisco's Municipal Transportation Agency (SFMTA) awarded Siemens a contract to deliver an initial 175 light rail cars, including an option for an additional 85 cars.

The new Siemens S200 Light Rail Vehicle platform, designed for North American applications, is equipped with a HaslerRail TELOC®3000 Event Recorder including Crash Protected Memory storing data resistant against fire, water, oil, impact and vibration. The system is fully compliant with IEEE1482.1-2013 and FRA.

HaslerRail together with Saira Americas (in Pittsburgh) offer local support, service and can comply with Buy America provisions.

Bombardier TRAXX with TELOC® 3000 JRU for ETCS and national data

HaslerRail's TELOC® data recorders are all capable of any recording combination: ETCS only, National Data only or combined ETCS and National Data solutions. Bombardier TRAXX (Transnational Railway Applications with eXtreme fleXibility) locomotives are equipped with a HaslerRail TELOC®2500 or TELOC®3000 JRU which complies with current TSI OPE and CCS and includes National Data as well. Since the locomotives are used for cross-border traffic all over Europe, a certification in the different countries is needed. Data can then be made available via wireless transfer if requested by the customer. The evaluation software Hasler®EVA+ allows the analysis of ETCS and National Data in one graphical overview and from more than one vehicle at the same time. Combined with GPS information (when available) events can be shown on a map.



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